

61. The process of Claim 60 wherein said mesenchymal stem cells are isolated, culture expanded human mesenchymal stem cells.

62. The process of Claim 60 wherein the mesenchymal stem cells are condensed into close proximity.

63. The process of Claim 62 wherein the mesenchymal stem cells are present as packed cells or a centrifugal cell pellet.

64. The process of Claim 60 wherein said at least one chondroinductive agent or factor is selected from the group consisting of (i) a glucocorticoid; (ii) a member of the transforming growth factor- $\beta$  super-family; (iii) a component of the collagenous extracellular matrix; and (iv) a vitamin A analog.

C1 65. The process of Claim 60 wherein said at least one chondroinductive agent is a combination of dexamethasone and TGF- $\beta$ 1.

66. The method of Claim 60, and further comprising placing said cells in a rigid porous vessel.

67. The method of Claim 66 wherein said rigid porous vessel is a ceramic cube.

68. The method of Claim 60 wherein said simple sugar is glucose.

69. The process of Claim 68 wherein said glucose is present in said serum-free medium in an amount of about 4.5 grams per liter.

70. A process for inducing chondrogenesis in mesenchymal stem cells by culturing mesenchymal stem cells in a chemically defined serum-free medium in vitro wherein the mesenchymal stem cells are associated in a three-dimensional format, and wherein said chemically defined serum-free medium comprises (1) a chemically defined minimum essential medium; (2) ascorbate or an analog thereof; (3) an iron source; (4)

insulin or an insulin-like growth factor; (5) at least one chondroinductive agent or factor; and (6) a simple sugar, said simple sugar being present in said medium in an amount of from about 3g/l to about 7g/l.

71. The process of Claim 70 wherein said mesenchymal stem cells are isolated, culture expanded human mesenchymal stem cells.

72. The process of Claim 70 wherein the mesenchymal stem cells are condensed into close proximity.

73. The process of Claim 72 wherein the mesenchymal stem cells are present as packed cells or a centrifugal cell pellet.

C 74. The process of Claim 70 wherein said at least one chondroinductive agent is selected from the group consisting of (i) a glucocorticoid; (ii) a member of the transforming growth factor- $\beta$  super-family; (iii) a component of the collagenous extracellular matrix; and (iv) a vitamin A analog.

75. The process of Claim 70 wherein said at least one chondroinductive agent is a combination of dexamethasone and TGF- $\beta$ 1.

76. The method of Claim 70, and further comprising placing said cells in a rigid porous vessel.

77. The method of Claim 76 wherein said rigid porous vessel is a ceramic cube.

78. The method of Claim 70 wherein said simple sugar is glucose.

79. The process of Claim 78 wherein said glucose is present in said serum-free medium in an amount of about 4.5 grams per liter.

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